

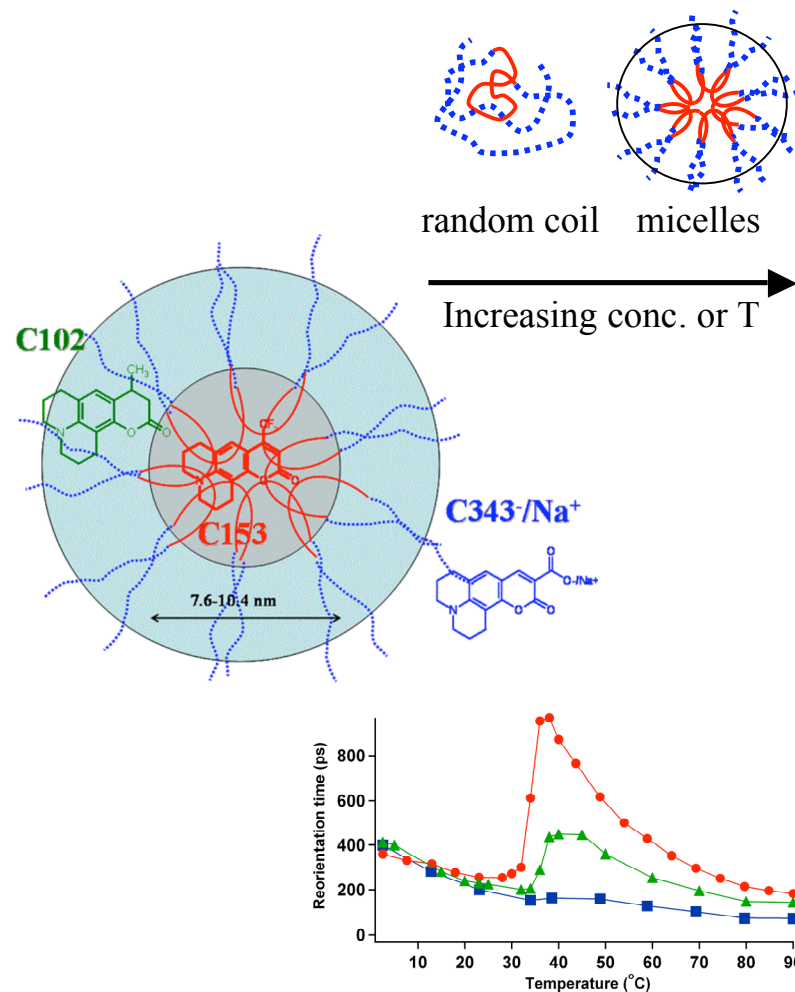
Microviscosity in Aqueous Polymer Micelles

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PEO-PPO-PEO triblock copolymers are widely used non-ionic surfactants. PEO and PPO represent poly(ethylene oxide) and poly(propylene oxide) blocks, respectively. In water, micelles form as the solution concentration and/or temperature is increased, as indicated in the top right schematic.

Using rigid solvatochromic coumarin fluorescence probe molecules, we investigate the local microviscosity and polarity in the micelles. By choosing three different coumarin probes each with a very different solubility, the probes localize in different micelle regions- in the hydrophobic PPO core, in the PEO corona, and in the bulk exterior water, as shown in the middle schematic.

Fluorescence anisotropy experiments measure the time scale for diffusive reorientation of the coumarin probe molecules--slower diffusion indicates higher microviscosity. As shown in the bottom graph, all three probes experience a random coil environment at lower temperatures. As the micelles form upon heating, the PPO cores display a higher friction. These multiple probe methods can be used to probe many other heterogeneous environments, including nanoparticles and proteins.



C. D. Grant, M. R. DeRitter, K. E. Steege, T. A. Fadeeva, and E. W. Castner, Jr., "Fluorescence probing of interior, interfacial, and exterior regions in solution aggregates of polyethylene oxide-polypropylene oxide-polyethylene oxide (PEO-PPO-PEO) triblock copolymers", submitted to *Langmuir*, October 1, 2004.